QZX

The Journal Covering Amateur Radio and Sinclair Computers
ZX80; Micro-Ace; ZX81; TS1000, 1500, and 2068; QL; Z88
Alex. F. Burr, K5XY, Publisher
2025 O'Donnell Drive
Las Cruces, NM
88001

Volume 10 Number 11 ($1.50 / issue) 1992 OCTOBER

* EDITOR'S NOTES K5XY
* UNCLASSIFIED ADS
* ZX81 GRAPHICS TEMPLATE K5XY
* PSEUDO-ROM K5XY

EDITOR'S NOTES

K5XY

In the unclassifieds there has been offered a FREE 16 K RAM for some time. Anybody want it? I am getting tired of printing that ad.

The "Hacker" is back. Some of you will remember the Hacker as one of the better newsletters published by Timex-Sinclair clubs. It expanded its coverage to include MS-DOS machines and shortly thereafter it died. I got a letter today saying that it was coming back. It will , however, not have any content of direct interest to Sinclair users. (It will concentrate on MS-DOS shareware reviews. These will be of little use to any Sinclair user except perhaps to QL users with a MS-DOS emulator.)

GOOD NEWS! I have finally heard from A. Eckhardt, a former QZX advertiser who produced the best interface to connect the ZX81 and TS1000 to a tnc for packet. He no longer has the completed interface, but he will sell (for about $25) the non-standard parts needed for you to build one of these interfaces for yourself. He has promised to write up some assembly instructions. Contact him at 918 Anna Street, Boalsburg, PA 16827. I have added him to the Vendor's list which is published from time to time.

UNCLASSIFIED ADS

WANTED: UNCLASSIFIED ADS for publication in QZX. Cost is 1 cent for each keystroke (characters, blanks, etc.). Payment must be included with order. This is an excellent way to sell your program or unwanted equipment, ask for help, or find a specific program. Send your ad with payment to QZX, 2025 O'Donnell, Las Cruces. NM 88001.

FREE: One Byte-Back M 16 16 K RAM (no printed circuit board on the feed through socket). Contributed by KA8THG. It would be appreciated if a contribution toward the mailing expenses were made. Send requests to QZX, 2025 O'Donnell, Las Cruces, NM 88001.

FOR SALE: Back issues of QZX, $1.00 each postpaid. QZX, 2025 O'Donnell. Las Cruces, NM 88001.

FOR SALE: CP/M books. Almost new. Half original price. *The Programmer's CP/M Handbook* by Andy Johnson-Laird. Osborne. Hardback. 500 pages $419. *The Byte Guide to CP/M* by Mark Dahmke. Mc Graw Hill. 250 pages. $8.50. *CP/M Users Guide* by Thom Hogan. Osborne. 330 pages. $8.95. *The CP/M Plus Handbook* by Alan R. Miller. Sybex. 250 pages. $7.5. *Inside CP/M Plus* by David E. Cortesi. Holt-Rinehart. 260 pages. $9.25. *CP/M Bible* by Waite and Angermeyer. Howard Sams. 430 pages. $9.90. *Users Guide to CP/M Systems* by Bove and Rhodes. Baen. 300 pages. $4.50. $1.00 each shipping and handling. A. F. Burr, 2025 O'Donnell. Las Cruces, NM 88001.

FREE..RAM chips, 2114 for the RAM add-on in the July issue of QZX. Please send postage and mention the number of chips you want. Bo Barry,

W4GHV, 8118 Kensington Lane, Harrisburg, NC 28075.

ZX81 Graphics Template

K5XY

The next page is a handy graphics template for the ZX81, TS1000, and TS1500. It will be useful when you are designing QSL cards where you want to get your call in large letters or even when you want to print a circuit diagram containing symbols for resistors and capacitors. In fact some reader might want to make a copy of this page and draw a uniform set of circuit symbols for the rest of the QZX readers.

Remember that there are two ways to put blocks on the screen. You can have graphic symbols printed AT a desired line and column, or you can PLOT at a specified pixel coordinate.

Note however that these two methods use entirely different coordinate systems, as the next page shows. The line and column system starts at the upper left hand corner. The number system for this coordinate system is along the top and left hand side of the form. The pixel coordinate system starts in the lower right hand corner and the number system is along the bottom and the right hand side. Note that there are four pixel positions to each line and

column square.

You can actually use the AT (line and column) system to turn on just the pixel you want but it is a little cumbersome. Note that the shifted 1, shifted 2, shifted 3, and shifted 4 keys (in the graphics mode) will turn on the pixel in the upper left, upper right, lower right, and lower left (respectively) pixel positions. Other graphics keys (the shifted space, Q, W, 7, 6, R, 5, 8, T, Y, and E) will produce all the other possible combinations of pixel activation.

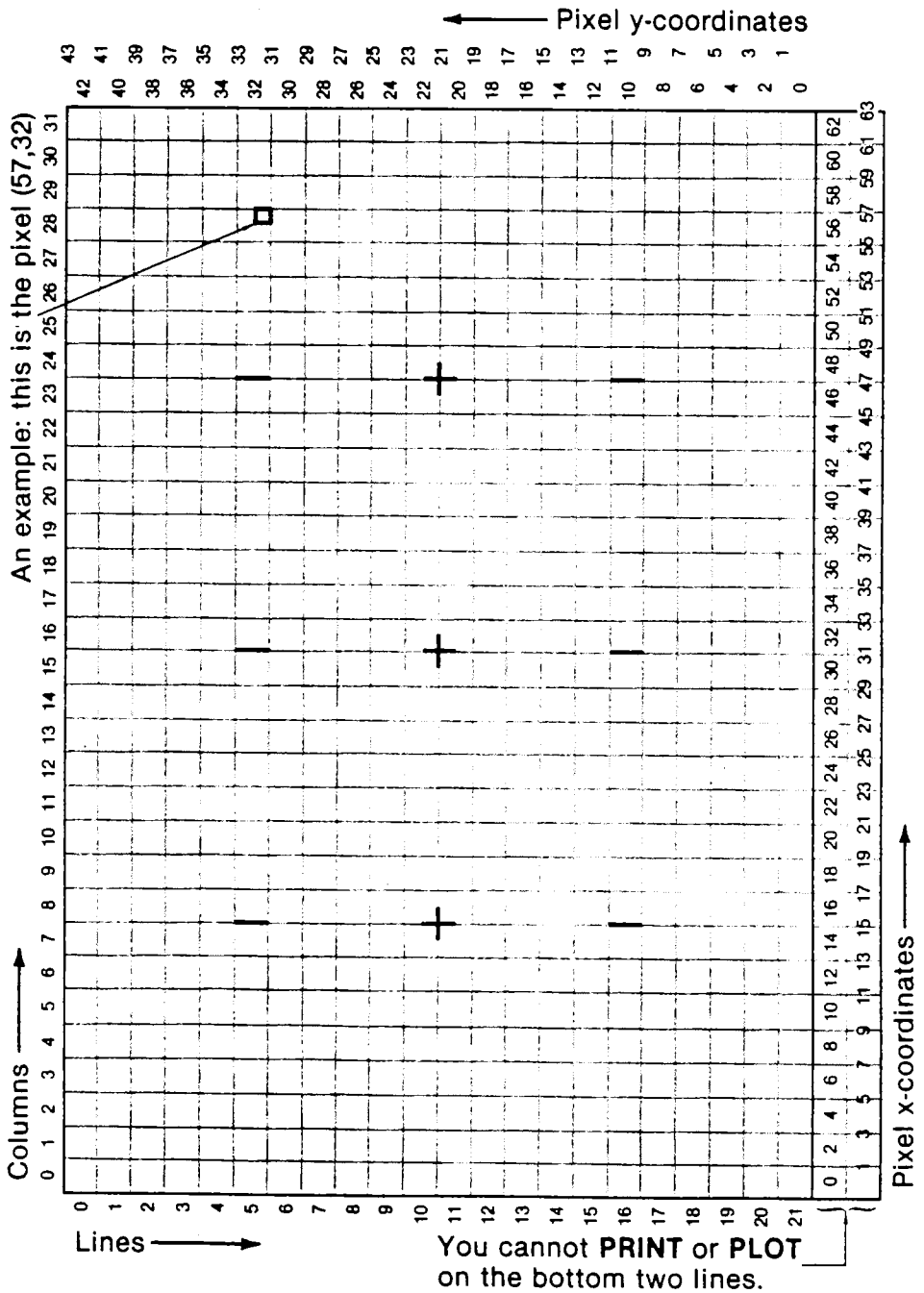
One way of using the next page is to copy it and then trace the picture you wish on it. The trace will tell you which spaces need activation and allow you to decide whether to use the AT or PLOT method of getting the desired design.

If the design is large and does not contain any elements which need high resolution, you can use the faster AT method. This method has the advantage that you can apply a bit of shading to the drawing by using the shifted A, shifted H, shifted D, shifted G, shifted S, and shifted F keys (all in the graphics mode). (By the way if you look carefully at your instruction manual you will notice that the shifted A does not give you quite the same pattern as the shifted H key.)

If the design has many high resolution elements in it, you will find it is easier to use the PLOT method and turn on directly just the one pixel you want. This method is usually best when you want to draw a reasonably complicated design under program control. Of course, you will then not be able to get any of the shading effect that the AT graphics keys permit. By judicious use of both methods you can combine the best features of both. Again the figure on the next page will help you with your design work.

If you want to try your hand at another way of making circuit symbols or other small designs, see the article on a Pseudo-ROM in this issue.

Support For
sinclair
ZX81 - spectrum - QL
and
TIMEX sinclair
1000 - 1500 - 2068
CAMBRIDGE
Z 88
computers


Pixel y-coordinates
An example: this is the pixel (57,32)
Columns
Lines
Pixel x-coordinates
You cannot PRINT or PLOT
on the bottom two lines.

Pseudo-ROM

The dot patterns for the displayable characters are held in a table in ROM, in locations 1E00 to 1FFF hex. The patterns are stored in order of the character CODE, 8 bytes being used for each character, corresponding to the 8 TV scan lines used to build up each character on the TV screen. The ROM table holds the dot patterns for 64 characters, the other 64 are the inverse (white on black) versions and are produced by the SCL chip inverting the video signal.

Looking at, for example, the character '0', this has the CODE 28 (1C hex) and is generated by the 8 ROM bytes starting at 1EE0 hex (1E00 + 1C x 8). The hexadecimal and binary values of these 8 bytes are shown alongside and the pattern can be seen in the binary version.

Addr.	Hex.	Binary
1EE0	00	00000000
1EE1	3C	00111100
1EE2	46	01000110
1EE3	4A	01001010
1EE4	52	01010010
1EE5	62	01100010
1EE6	3C	00111100
1EE7	00	00000000

When the ZX81 is producing the display, it presents 13 bit addresses to the ROM to select the wanted 8 bit patterns. The low 9 address lines, which specify which character is being displayed and which of the 8 horizontal scan lines is currently being generated, come from the SCL chip. The high 4 address lines come from the Z80 processor and are actually bits 1 to 4 of the Z80's I register, which is set to 1E hex by NEW.

Because the starting address of the table is determined by the contents of the Z80's I register, we can alter it. As a demonstration, the following program displays 64 characters then loads the I register with 0, making the ZX81 use the beginning of the ROM as a dot pattern table. Ten seconds later, the display will be returned to normal by restoring the correct value to the I register.

```
 1 REM 12345
10 POKE 16514,62
20 POKE 16515,0
30 POKE 16516,237
40 POKE 16517,71
50 POKE 16518,201

100 FOR A=0 TO 63
110 PRINT CHR$ A;
120 NEXT A
130 RAND USR 16514
140 PAUSE 500
150 POKE 16515,30
160 RAND USR 16514
```

The machine code routine used is;

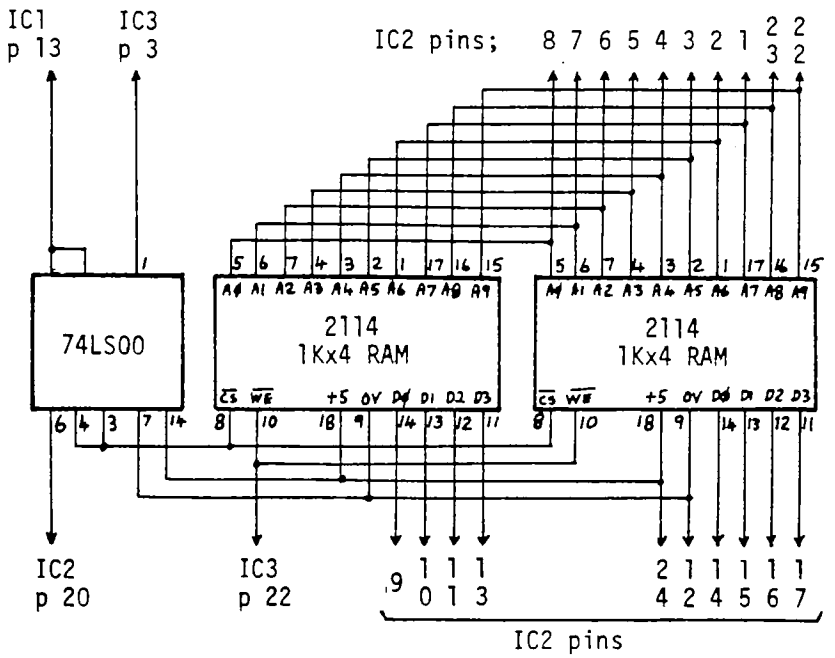
```
3E 00     LDA 0
ED 47     LD I A
C9        RET
```

As the beginning of the ZX81's ROM wasn't intended to be used as a dot pattern table, it gives a meaningless display ! But, if we were to add some RAM to the ZX81, in such a way that the

display generation circuits could use it, then we could POKE any dot patterns we wanted into this 'Pseudo ROM', and so create our own character set. This could include shapes for games programs, mathematical or engineering symbols, or elements for high resolution drawings.

The circuit given below shows how 1K of RAM can be added in this way. Because all of the wanted signals are not present on the ZX81's rear connector, the 'Pseudo ROM' is best fitted inside the ZX81's case, with the connections wired directly as shown. The extra current taken from the +5V supply will make the ZX81's regulator run slightly hotter, but you have drilled cooling holes in the case, haven't you ?

It occupies addresses 2000-23FF hex (8192-9215 decimal). This is enough for 2 sets of 64 characters, or you could load just one set of characters and have 512 bytes left to hold machine code or other data. The routine given on the previous page can be used to force the ZX81 to use the dot patterns held in the Pseudo ROM by changing the value POKEd by line 20 to 32 to select the lower ½K of the Pseudo ROM, or 34 to select the upper half. Data (including dot patterns) stored in the Pseudo ROM won't be SAVEd, but neither is it affected by NEW or LOAD, so you can run one program to fill the Pseudo ROM with appropriate data, then LOAD another program to use it.



Note; R28 (680 ohm) to be removed from ZX81 board.

73, K5XY

QZX presents the best software and hardware projects available for the radio amateur. While the contents are believed to be accurate, no warranty is extended on any program or project. No investigation has been made of the claims or reputation of any advertiser. It would be greatly appreciated if all correspondence requiring an answer would be accompanied by a self-addressed stamped envelope (SASE). Copyright by QZX, 1992. All rights reserved, photocopying by permission only
ISSN 1055-1735

Please send me QZX for one year, starting immediately. Enclosed is $15.00 for twelve issues. (Those with addresses not in Canada, the US, or Mexico send $25.00 in US funds for air mail delivery.) Thanks. (92/10)

Name _____

Call _____

Address _____

City _____

State ____ Zip _____

Country _____

QZX Journal
2025 O'Donnell Drive
Las Cruces, NM 88001

FIRST CLASS